

STATE OF NEW HAMPSHIRE

Inter-Department Communication

DATE: February 27, 2017
AT (OFFICE): NHPUC

FROM: Randy Knepper
 Director – Safety Division

SUBJECT: Docket No. DE 15-460, DE 15-461, DE 15-462 and DE 15-463
 Northern Pass Transmission Project
 Northern Pass Transmission, LLC (NPT) and
 Public Service Company of New Hampshire d/b/a Eversource Energy (ESE)
**Staff Recommendation #4 regarding
 19 Licenses to Cross Public Waters and Lands**

TO: Debra Howland, Executive Director
 Thomas Frantz, Director, Electric Division
 Leszek Stachow, Assistant Director, Electric Division
 Suzanne Amidon, Staff Attorney

cc: Robert Wyatt, Assistant Director, Safety Division

Public waters and lands crossings included in this recommendation

Table 1 Zone 4 - List of NPT and ESE Crossings

Staff Zone-Map #	Water/Land Name	DE 15-460 NPT Water Crossing/License	DE 15-461 NPT Land Crossing/License	DE 15-462 ESE Water Crossing/License	DE 15-463 ESE Land Crossing/License	Totals
4-20	Northern Rail Trail	--	Franklin	--	Franklin	2
4-20	NHDOT Land	--	Franklin	--	Franklin	2
4-20	Merrimack River	Franklin	--	Franklin	--	2
4-21	NHDOT RR	--	Canterbury	--	Canterbury	2
4-22	Turtle Pond	Concord	--	Concord (2)	--	3
4-23	Soucook River	Concord	--	Concord (2)	--	3
4-23	NHAG Land	--	Pembroke	--	Pembroke (2)	3
4-24	Suncook River	Pembroke	--	--	--	1
4-24	Bear Brook Park	--	Allenstown	--	---	1
Zone 4	Total Licenses	4 NPT Water	5 NPT Land	5 ESE Water	5 ESE Land	19

Staff Recommendation #4 for Zone 4 crossings

NPT filed petitions pursuant to RSA 371:17 in docket no. DE 15-460, DE 15-461, DE 15-462 and DE 15-463, for licenses to construct and maintain electric lines over, under and across public waters, lands and rails at 19 locations along the proposed path between Franklin and Allenstown, New Hampshire (Zone 4). The proposed 345kV alternating current high-voltage electric transmission line is referenced in the petitions as the 3120 Line. Other existing Eversource circuits along the project path that will require licenses to cross public waters or lands are identified by their assigned circuit numbers and operate at alternating current (AC).

The methodology used by Staff to determine how the analysis was performed is presented in the Overall Recommendation memorandum.

This Recommendation #4 is to provide the details examined that apply to Zone 4.

Within Zone 4 there are no underground proposed installations. All 19 remaining crossings are overhead for land, public waters, and rails. The 19 crossings are sequentially labeled from, north to south. All mapping and data collection tables are presented in and follow the same sequence.

Table 2 gives pertinent information tables provided in this Staff Recommendation regarding overhead crossing information that has been reviewed or otherwise analyzed as appropriate.

TABLE 2 ZONE 4 AERIAL CROSSINGS												
Staff Zone- Map #	Water/Land Name	Town	Type Crossing	Voltage/Type	NPT/ESE	Circuit	Staff Calculated Clearance SAG 10	Clearance Shown on Petition Profile	Calculated Difference	Required Clearance NESC	Span ft	Verification
			Land									
			Rail									
			Water									
4-20	Northern Rail Trail	Franklin	Rail	345kV/AC	NPT	3132	64	57	7	32.7	738.56	Adequate
4-20	Northern Rail Trail	Franklin	Rail	115kV/AC	ESE	F139	58	56	2	28.1	444.68	Excellent
4-20	NHDOT Land	Franklin	Land	345kV/AC	NPT	3132	53	48	5	20.8	738.56	Good
4-20	NHDOT Land	Franklin	Land	115kV/AC	ESE	F139	64	62	2	16.1	503.02	Excellent
4-20	Merrimack River	Franklin	Water	345kV/AC	NPT	3132	53	47	6	34.7	738.56	Good
4-20	Merrimack River	Franklin	Water	115kV/AC	ESE	F139	56	55	1	30.1	503.02	Excellent
4-21	NHDOT RR Concord Lincoln Line	Canterbury	Rail	345kV/AC	NPT	3132	81	77	4	32.7	631.40	Good
4-21	NHDOT RR Concord Lincoln Line	Canterbury	Rail	115kV/AC	ESE	F139	81	80	1	28.1	638.29	Excellent
4-22	Turtle Pond	Concord	Water	345kV/AC	NPT	3132	44	43	1	34.7	730.06	Excellent
4-22	Turtle Pond	Concord	Water	34.5kV/AC	ESE	318	32	32	0	25.5	180.43	Excellent
4-22	Turtle Pond	Concord	Water	115kV/AC	ESE	P145	33	33	0	30.1	531.20	Excellent
4-23	Soucook River	Concord	Water	320kV/DC	NPT	3132	61	59	2	34.7	919.04	Excellent
4-23	Soucook River	Concord	Water	115kV/AC	ESE	P145	62	59	3	30.1	1172.27	Excellent
4-23	Soucook River	Concord	Water	115kV/AC	ESE	C189	35	33	2	30.1	1172.48	Excellent
4-23	NHAG Land	Pembroke	Land	345kV/AC	NPT	3132	30	31	-1	20.8	799.56	Excellent
4-23	NHAG Land	Pembroke	Land	115kV/AC	ESE	P145	31	29	2	16.1	1172.47	Excellent
4-23	NHAG Land	Pembroke	Land	115kV/AC	ESE	C189	50	44	6	16.1	1172.47	Good
4-24	Suncook River	Pembroke	Water	345kV/AC	NPT	3132	40	38	2	34.7	682.57	Excellent
4-24	Bear Brook Park	Allenstown	Land	345kV/AC	NPT	3132	34	30	4	20.8	596.30	Good

Refer to 5 detailed PUC generated single-page maps using its GIS mapping software specific to each crossing location. Each detailed map depicted all circuits, (proposed and existing including those that will be relocated and those that will remain in place). Support structures, Support structure

identifications, support structure heights, ROW widths, proper orientation of circuits, dimensions of spans, parcel information known as line lists (which emanated from NPT and ESE's petitions) are all depicted. Typical elevation views within the Right of Way are shown including cross sections within the ROW are taken from Forward NH Plans located at www.northernpass.us/towns.htm. In addition to the above geographical information was also depicted such as roads, buildings, rivers, trees, neighborhoods, bridges, and town lines.

Refer to Appendix A for single-page tables of information specific to each crossing, with a comments, conclusions, conditions and recommendations. Staff designated Zone 4 has identified 19 public waters, rails, and lands crossings that will require licenses. Specific technical and information relevant to the crossing are identified in each Appendix A table.

Existing license(s) and permissions previously granted by the PUC for these locations

See Attachments A1, A2 or A3 of the Overall Recommendation for licenses previously granted. NPT and ESE petitions were for the new DC transmission line and only for relocated ESE transmission lines. ESE did not include licenses for those existing transmission lines that were not being altered.

Existing Circuits where ESE does not have a license.

None are applicable for this zone.

Safety Division Specific Recommendations with any applicable conditions:

See individual crossing details listed within Tables A.4.20a.1, A.4.20a.2, A.4.20b.1, A.4.20b.2, A.4.20c.1, A.4.20c.2, A.4.21.1, A.4.21.2, A.4.22.1, A.4.22.2a, A.4.22.2b, A.4.23a.1, A.4.23a.2a, A.4.23a.2b, A.4.23.b.1, A.4.23b.2a, A.4.23b.2b, A.4.24a.1, A.4.24b.1 located in Appendix A of Recommendation #4.

Public Water/Land Crossing Name: Northern Rail Trail, Franklin, NH for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-461	Voltage	345 kV
PUC Zone	4	Circuit	3132
PUC Map Number	20	Conductor Type	ACSR
Petitioner (NPT, ESE)	NPT	Code Name	Lapwing
Petitioner Line List # (for Parcels traversed)	7075	Conductor Size	1590 kcmil
Crossing Circuit Configuration	Overhead	Stranding	45/7
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	26
Previous Public Crossing License Issued by PUC	No	Conductor Vertical Separation	0
Relocated ESE Crossing (Yes/No/NA)	NA	Cable Weight (Lbs/Ft)	2
Right of Way Width	225 feet	Back Pole Number	3132-4
Number of Circuits within ROW	1 new(AC), 2 existing	Back Structure Height	90
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	297.58
Total Structures/Poles/Manholes	2	Back Conductor Height	64.5
First Structure Identification	3132-4	Back Conductor Elev. at Pole	362.08
State Listed Public Waters (Yes/No/Not Applicable)	Not Applicable	Forward Pole Number	3132-5
Last Structure Identification	3132-5	Forward Structure Height	85
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	282.19
		Forward Conductor Height	59.5
		Forward Conductor Elev. at Pole	341.69
		Span (Feet)	738.56
		Max Tension NESC Heavy lbs.	11,400
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	4,025
		Calc'd. Clearance (SAG 10)	64
		Clearance Shown on Profile	57
		Req'd Clearance (NESC)	32.7
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	This NPT crossing traverses State-owned land in this section of Franklin, NH. The land is managed by the NH DOT, Bureau of Rail and Transit. In response to a NH PUC Staff inquiry, the NH DOT provided comments that noted the NH DRED has managed the rail trail through this area for more than ten years.		
	The Northern Rail Trail follows the rail corridor through these parcels and is used for a variety of recreation activities including snowmobiling, cross country skiing, walking, hiking, biking, etc..		
	In response to Staff's inquiry, NH DOT informed Staff that Eversource has been a responsible partner in maintaining its existing facilities across as they cross the NH DOT properties. NH DOT does not foresee any negative impacts related to the proposed reconfiguration of the utility infrastructure across this parcel.		
Conclusions	The proposed public land crossing will not substantially affect the public rights on this land, nor will the proposed crossing substantially affect the functional use and safety in these public lands.		
	The proposed design for this overhead crossing of public lands meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public lands identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Northern Rail Trail, Franklin, NH for ESE

General Information		Technical Information	
PUC Docket Number	DE 15-463	Voltage	115 kV
PUC Zone	4	Circuit	F139
PUC Map Number	20	Conductor Type	ACSR
Petitioner (NPT, ESE)	ESE	Code Name	Drake
Petitioner Line List # (for Parcels traversed)	7075	Conductor Size	795 kcmil
Crossing Circuit Configuration	Overhead	Stranding	26/7
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	0
Previous Public Crossing License Issued by PUC	No	Conductor Vertical Separation	12
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	1,094
Right of Way Width	225 feet	Back Pole Number	F139-282
Number of Circuits within ROW	1 new(AC), 2 existing	Back Structure Height	94.5
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	318.69
Total Structures/Poles/Manholes	2	Back Conductor Height	57
First Structure Identification	F139-282	Back Conductor Elev. at Pole	375.69
State Listed Public Waters (Yes/No/Not Applicable)	Not Applicable	Forward Pole Number	F139-281
Last Structure Identification	F139-281	Forward Structure Height	105
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	270.44
		Forward Conductor Height	67.5
		Forward Conductor Elev. at Pole	337.94
		Span (Feet)	444.68
		Max Tension NESC Heavy lbs.	9,000
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	
		Calc'd. Clearance (SAG 10)	58
		Clearance Shown on Profile	56
		Req'd Clearance (NESC)	28.1
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	This ESE crossing traverses State-owned land in this section of Franklin, NH. The land is managed by the NH DOT, Bureau of Rail and Transit. In response to a NH PUC Staff inquiry, the NH DOT provided comments that noted the NH DRED has managed the rail trail through this area for more than ten years.		
	The Northern Rail Trail follows the rail corridor through these parcels and is used for a variety of recreation activities including snowmobiling, cross country skiing, walking, hiking, biking, etc..		
	In response to Staff's inquiry, NH DOT informed Staff that Eversource has been a responsible partner in maintaining its existing facilities across as they cross the NH DOT properties. NH DOT does not foresee any negative impacts related to the proposed reconfiguration of the utility infrastructure across this parcel.		
Conclusions	The proposed public land crossing will not substantially affect the public rights on this land, nor will the proposed crossing substantially affect the functional use and safety in these public lands.		
	The proposed design for this overhead crossing of public lands meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public lands identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: NHDOT (Vacant) Land, Franklin, NH for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-461	Voltage	345 kV
PUC Zone	4	Circuit	3132
PUC Map Number	20	Conductor Type	ACSR
Petitioner (NPT, ESE)	NPT	Code Name	Lapwing
Petitioner Line List # (for Parcels traversed)	7076	Conductor Size	1590 kcmil
Crossing Circuit Configuration	Overhead	Stranding	45/7
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	--
Previous Public Crossing License Issued by PUC	No	Conductor Vertical Separation	--
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	1.792
Right of Way Width	225 feet	Back Pole Number	3132-4
Number of Circuits within ROW	1 new(AC), 2 existing	Back Structure Height	90
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	297.58
Total Structures/Poles/Manholes	2	Back Conductor Height	65.0
First Structure Identification	3132-4	Back Conductor Elev. at Pole	362.58
State Listed Public Waters (Yes/No/Not Applicable)	Not Applicable	Forward Pole Number	3132-5
Last Structure Identification	3132-5	Forward Structure Height	85
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	213 feet	Forward Ground Elevation	282.19
		Forward Conductor Height	60.0
		Forward Conductor Elev. at Pole	342.19
		Span (Feet)	738.56
		Max Tension NESC Heavy lbs.	11,400
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	4,025
		Calc'd. Clearance (SAG 10)	53
		Clearance Shown on Profile	48
		Req'd Clearance (NESC)	20.8
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	This NPT crossing traverses a small section of State-owned land between the Northern Rail Trail and the Merrimack River, approximately 1,000 feet north of the Boscawen town line in Franklin, NH. The land is managed by the NH DOT.		
	In response to Staff's inquiry, NH DOT informed Staff that Eversource has been a responsible partner in maintaining its existing facilities across as they cross the NH DOT properties. NH DOT does not foresee any negative impacts related to the proposed reconfiguration of the utility infrastructure across this parcel.		
	The Northern Rail Trail follows the rail corridor through these parcels and is used for a variety of recreation activities including snowmobiling, cross country skiing, walking, hiking, biking, etc.. NH DOT does not foresee any negative impacts to the public's use of this property as a result of the proposed project.		
Conclusions	The proposed public land crossing will not substantially affect the public rights on this land, nor will the proposed crossing substantially affect the functional use and safety in these public lands.		
	The proposed design for this overhead crossing of public lands meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public lands identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: NHDOT (Vacant) Land, Franklin, NH for ESE

General Information		Technical Information	
PUC Docket Number	DE 15-463	Voltage	115 kV
PUC Zone	4	Circuit	F139
PUC Map Number	20	Conductor Type	ACSR
Petitioner (NPT, ESE)	ESE	Code Name	Drake
Petitioner Line List # (for Parcels traversed)	7076	Conductor Size	795 kcmil
Crossing Circuit Configuration	Overhead	Stranding	26/7
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	--
Previous Public Crossing License Issued by PUC	No	Conductor Vertical Separation	--
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	1,094
Right of Way Width	225 feet	Back Pole Number	F139-281
Number of Circuits within ROW	1 new(AC), 2 existing	Back Structure Height	105
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	270.44
Total Structures/Poles/Manholes	2	Back Conductor Height	67.5
First Structure Identification	F139-282	Back Conductor Elev. at Pole	337.94
State Listed Public Waters (Yes/No/Not Applicable)	Not Applicable	Forward Pole Number	F139-280
Last Structure Identification	F139-280	Forward Structure Height	92.5
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	200 feet	Forward Ground Elevation	282.84
		Forward Conductor Height	55.02
		Forward Conductor Elev. at Pole	337.86
		Span (Feet)	444.68
		Max Tension NESC Heavy lbs.	9,000
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	2,381
		Calc'd. Clearance (SAG 10)	64
		Clearance Shown on Profile	62
		Req'd Clearance (NESC)	16.1
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	This relocated ESE crossing traverses a small section of State-owned land between the Northern Rail Trail and the Merrimack River, approximately 1,000 feet north of the Boscawen town line in Franklin, NH. The land is managed by the NH DOT.		
	In response to Staff's inquiry, NH DOT informed Staff that Eversource has been a responsible partner in maintaining its existing facilities across as they cross the NH DOT properties. NH DOT does not foresee any negative impacts related to the proposed reconfiguration of the utility infrastructure across this parcel.		
	The Northern Rail Trail follows the rail corridor through these parcels and is used for a variety of recreation activities including snowmobiling, cross country skiing, walking, hiking, biking, etc.. NH DOT does not foresee any negative impacts to the public's use of this property as a result of the proposed project.		
Conclusions	The proposed public land crossing will not substantially affect the public rights on this land, nor will the proposed crossing substantially affect the functional use and safety in these public lands.		
	The proposed design for this overhead crossing of public lands meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public lands identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Merrimack River, Franklin, NH for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-460	Voltage	345 kV
PUC Zone	4	Circuit	3132
PUC Map Number	20	Conductor Type	ACSR
Petitioner (NPT, ESE)	NPT	Code Name	Lapwing
Petitioner Line List # (for Parcels traversed)	7077	Conductor Size	1590 kmcil
Crossing Circuit Configuration	Overhead	Stranding	45/7
Public Crossing Type (Water/Land)	Water	Conductor Horizontal Separation	26
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	0
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	1.792
Right of Way Width	225 feet	Back Pole Number	3132-4
Number of Circuits within ROW	1 new(AC), 2 existing	Back Structure Height	90
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	297.58
Total Structures/Poles/Manholes	2	Back Conductor Height	64.5
First Structure Identification	3132-4	Back Conductor Elev. at Pole	362.08
State Listed Public Waters (Yes/No/Not Applicable)	Yes	Forward Pole Number	3132-5
Last Structure Identification	3132-5	Forward Structure Height	85
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	282.19
		Forward Conductor Height	59.5
		Forward Conductor Elev. at Pole	341.69
		Span (Feet)	738.56
		Max Tension NESC Heavy lbs.	11,400
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	4,025
		Calc'd. Clearance (SAG 10)	53
		Clearance Shown on Profile	47
		Req'd Clearance (NESC)	34.7
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	This section of the Merrimack River is used recreationally for boating, canoe and kayaking, fishing and swimming.		
	In order to determine the minimum NESC clearance above the water, the engineering design incorporates flood water elevations that are based on information contained in flood insurance rate maps provided by FEMA. The design uses the 100-year flood elevation for this portion of the river.		
	The design incorporates NESC minimum required clearance above the water for these open supply conductors, using 100-year flood data (28.5 feet) plus the additional NESC Rule 232.C.1 requirement (6.24 feet) brings the minimum clearance to 34.7 feet.		
Conclusions	The proposed public water crossing will not substantially affect the public rights in these waters, nor will the proposed crossing substantially affect the functional use and safety in these public waters.		
	The the proposed design for this overhead crossing across public waters meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public waters identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public water crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Merrimack River, Franklin, NH for ESE

General Information		Technical Information	
PUC Docket Number	DE 15-462	Voltage	115 kV
PUC Zone	4	Circuit	F139
PUC Map Number	20	Conductor Type	ACSR
Petitioner (NPT, ESE)	ESE	Code Name	Drake
Petitioner Line List # (for Parcels traversed)	7076	Conductor Size	795 kcmil
Crossing Circuit Configuration	Overhead	Stranding	26/7
Public Crossing Type (Water/Land)	Water	Conductor Horizontal Separation	0
Previous Public Crossing License Issued by PUC	Yes	Conductor Vertical Separation	12
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	1.094
Right of Way Width	225 feet	Back Pole Number	F139-281
Number of Circuits within ROW	1 new(AC), 2 existing	Back Structure Height	105
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	270.44
Total Structures/Poles/Manholes	2	Back Conductor Height	67.5
First Structure Identification	F139-281	Back Conductor Elev. at Pole	337.94
State Listed Public Waters (Yes/No/Not Applicable)	Yes	Forward Pole Number	F139-280
Last Structure Identification	F139-280	Forward Structure Height	92.5
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	282.84
		Forward Conductor Height	55
		Forward Conductor Elev. at Pole	337.84
		Span (Feet)	503.02
		Max Tension NESC Heavy lbs.	9,000
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	2,381
		Calc'd. Clearance (SAG 10)	56
		Clearance Shown on Profile	55
		Req'd Clearance (NESC)	30.1
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	This section of the Merrimack River is used recreationally for boating, canoe and kayaking, fishing and swimming.		
	In order to determine the minimum NESC clearance above the water, the engineering design incorporates flood water elevations that are based on information contained in flood insurance rate maps provided by FEMA. The design uses the 100-year flood elevation for this portion of the river.		
	The design incorporates NESC minimum required clearance above the water for these open supply conductors, using 100-year flood data (28.5 feet) plus the additional NESC Rule 232.C.1 requirement (1.59 feet) brings the minimum clearance to 30.1 feet.		
Conclusions	The proposed public water crossing will not substantially affect the public rights in these waters, nor will the proposed crossing substantially affect the functional use and safety in these public waters.		
	The the proposed design for this overhead crossing across public waters meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public waters identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public water crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: NH DOT, NH Rail-Concord/Lincoln Line, Canterbury, NH for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-461	Voltage	345 kV
PUC Zone	4	Circuit	3132
PUC Map Number	21	Conductor Type	ACSR
Petitioner (NPT, ESE)	NPT	Code Name	Lapwing
Petitioner Line List # (for Parcels traversed)	7616.1	Conductor Size	1590 kcmil
Crossing Circuit Configuration	Overhead	Stranding	45/7
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	26
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	0
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	1.792
Right of Way Width	225 feet	Back Pole Number	3132-32
Number of Circuits within ROW	1 new(AC), 2 existing	Back Structure Height	110
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	390.72
Total Structures/Poles/Manholes	2	Back Conductor Height	84.5
First Structure Identification	3132-32	Back Conductor Elev. at Pole	475.22
State Listed Public Waters (Yes/No/Not Applicable)	Not Applicable	Forward Pole Number	3132-33
Last Structure Identification	3132-33	Forward Structure Height	105
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	441.05
		Forward Conductor Height	79.5
		Forward Conductor Elev. at Pole	520.55
		Span (Feet)	631.4
		Max Tension NESC Heavy lbs.	11,400
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	
		Calc'd. Clearance (SAG 10)	81
		Clearance Shown on Profile	77
		Req'd Clearance (NESC)	32.7
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	This NPT crossing traverses State-owned land in this section of Canterbury, NH. The land is managed by the NH DOT, Bureau of Rail and Transit and used by NH Rail-Concord/Lincoln Line as a seasonally active freight rail line between Concord and Tilton.		
	The NH DRED manages the winter recreational use along this rail corridor, which is used for a variety of recreation activities including snowmobiling, cross country skiing, snowshoeing, etc..		
	In response to Staff's inquiry, NH DOT informed Staff that Eversource has been a responsible partner in maintaining its existing facilities across as they cross the NH DOT properties. NH DOT does not foresee any negative impacts related to the proposed reconfiguration of the utility infrastructure across this parcel.		
Conclusions	The proposed public land crossing will not substantially affect the public rights on this land, nor will the proposed crossing substantially affect the functional use and safety in these public lands.		
	The proposed design for this overhead crossing of public lands meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public lands identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: NH DOT, NH Rail-Concord/Lincoln Line, Canterbury, NH for ESE

General Information		Technical Information	
PUC Docket Number	DE 15-463	Voltage	115 kV
PUC Zone	4	Circuit	F139
PUC Map Number	21	Conductor Type	ACSR
Petitioner (NPT, ESE)	ESE	Code Name	Drake
Petitioner Line List # (for Parcels traversed)	7616.1	Conductor Size	795 kcmil
Crossing Circuit Configuration	Overhead	Stranding	26/7
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	5
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	1.5 (Middle Phase)
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	1.094
Right of Way Width	225 feet	Back Pole Number	F139-250
Number of Circuits within ROW	1 new(AC), 2 existing	Back Structure Height	124
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	392.78
Total Structures/Poles/Manholes	2	Back Conductor Height	86.5
First Structure Identification	F139-250	Back Conductor Elev. at Pole	479.28
State Listed Public Waters (Yes/No/Not Applicable)	Not Applicable	Forward Pole Number	F139-249
Last Structure Identification	F139-249	Forward Structure Height	110.5
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	437.07
		Forward Conductor Height	73
		Forward Conductor Elev. at Pole	510.07
		Span (Feet)	638.29
		Max Tension NESC Heavy lbs.	9,000
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	
		Calc'd. Clearance (SAG 10)	81
		Clearance Shown on Profile	80
		Req'd Clearance (NESC)	28.1
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	This ESE crossing traverses State-owned land in this section of Canterbury, NH. The land is managed by the NH DOT, Bureau of Rail and Transit and used by NH Rail-Concord/Lincoln Line as a seasonally active freight rail line between Concord and Tilton.		
	The NH DRED manages the winter recreational use along this rail corridor, which is used for a variety of recreation activities including snowmobiling, cross country skiing, snowshoeing, etc..		
	In response to Staff's inquiry, NH DOT informed Staff that Eversource has been a responsible partner in maintaining its existing facilities across as they cross the NH DOT properties. NH DOT does not foresee any negative impacts related to the proposed reconfiguration of the utility infrastructure across this parcel.		
Conclusions	The proposed public land crossing will not substantially affect the public rights on this land, nor will the proposed crossing substantially affect the functional use and safety in these public lands.		
	The proposed design for this overhead crossing of public lands meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public lands identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Turtle Pond, Concord, NH, for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-460	Voltage	345 kV
PUC Zone	4	Circuit	3132
PUC Map Number	22	Conductor Type	ACSR
Petitioner (NPT, ESE)	NPT	Code Name	Lapwing
Petitioner Line List # (for Parcels traversed)	8076	Conductor Size	1590 kcmil
Crossing Circuit Configuration	Overhead	Stranding	45/7
Public Crossing Type (Water/Land)	Water	Conductor Horizontal Separation	26
Previous Public Crossing License Issued by PUC	Yes	Conductor Vertical Separation	0
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	1.792
Right of Way Width	257.5 feet	Back Pole Number	3132-115
Number of Circuits within ROW	1 new(AC), 3 existing	Back Structure Height	95
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	317.12
Total Structures/Poles/Manholes	4	Back Conductor Height	69.5
First Structure Identification	3123-112	Back Conductor Elev. at Pole	386.62
State Listed Public Waters (Yes/No/Not Applicable)	Yes	Forward Pole Number	3132-116
Last Structure Identification	3132-117	Forward Structure Height	105
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	315.91
		Forward Conductor Height	79.5
		Forward Conductor Elev. at Pole	395.41
		Span (Feet)	730.06
		Max Tension NESC Heavy lbs.	11,400
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	4,003
		Calc'd. Clearance (SAG 10)	44
		Clearance Shown on Profile	43
		Req'd Clearance (NESC)	34.7
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	This section of Turtle Pond is used recreationally for boating, canoe and kayaking, and fishing.		
	In order to determine the minimum NESC clearance above the water, the engineering design incorporates flood water elevations that are based on information contained in flood insurance rate maps provided by FEMA. The design uses the 100-year flood elevation for this portion of the river.		
	The design incorporates NESC minimum required clearance above the water for these open supply conductors, using 100-year flood data (28.5 feet) plus the additional NESC Rule 232.C.1 requirement (6.24 feet) brings the minimum clearance to 34.7 feet.		
Conclusions	The proposed public water crossing will not substantially affect the public rights in these waters, nor will the proposed crossing substantially affect the functional use and safety in these public waters.		
	The the proposed design for this overhead crossing across public waters meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public waters identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public water crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Turtle Pond, Concord, NH, for ESE

General Information		Technical Information	
PUC Docket Number	DE 15-462	Voltage	115 kV
PUC Zone	4	Circuit	P145
PUC Map Number	22	Conductor Type	ACSR
Petitioner (NPT, ESE)	ESE	Code Name	Drake
Petitioner Line List # (for Parcels traversed)	8076	Conductor Size	795 kcmil
Crossing Circuit Configuration	Overhead	Stranding	26/7
Public Crossing Type (Water/Land)	Water	Conductor Horizontal Separation	0
Previous Public Crossing License Issued by PUC (Yes/No)	Yes	Conductor Vertical Separation	12
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	1.094
Right of Way Width	257.5 feet	Back Pole Number	P145-131
Number of Circuits within ROW	1 new(AC), 3 existing	Back Structure Height	79
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	321.77
Total Structures/Poles/Manholes	6	Back Conductor Height	41.5
First Structure Identification	P145-134	Back Conductor Elev. at Pole	363.27
State Listed Public Waters (Yes/No/Not Applicable)	Yes	Forward Pole Number	P145-130
Last Structure Identification	P145-128	Forward Structure Height	88
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	317.39
		Forward Conductor Height	50.5
		Forward Conductor Elev. at Pole	367.89
		Span (Feet)	531.2
		Max Tension NESC Heavy lbs.	9,000
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	2,448
		Calc'd. Clearance (SAG 10)	33
		Clearance Shown on Profile	33
		Req'd Clearance (NESC)	30.1
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	This section of Turtle Pond is used recreationally for boating, canoe and kayaking, and fishing.		
	In order to determine the minimum NESC clearance above the water, the engineering design incorporates flood water elevations that are based on information contained in flood insurance rate maps provided by FEMA. The design uses the 100-year flood elevation for this portion of the river.		
	The design incorporates NESC minimum required clearance above the water for these open supply conductors, using 100-year flood data (28.5 feet) plus the additional NESC Rule 232.C.1 requirement (1.59 feet) brings the minimum clearance to 30.1 feet.		
Conclusions	The proposed public water crossing will not substantially affect the public rights in these waters, nor will the proposed crossing substantially affect the functional use and safety in these public waters.		
	The the proposed design for this overhead crossing across public waters meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public waters identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public water crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Turtle Pond, Concord, NH, for ESE

General Information		Technical Information	
PUC Docket Number	DE 15-462	Voltage	34.5 kV
PUC Zone	4	Circuit	318
PUC Map Number	22	Conductor Type	ACSR
Petitioner (NPT, ESE)	NSE	Code Name	Penguin
Petitioner Line List # (for Parcels traversed)	8076	Conductor Size	4/0 AWG 6/1
Crossing Circuit Configuration	Overhead	Stranding	1-Jun
Public Crossing Type (Water/Land)	Water	Conductor Horizontal Separation	5
Previous Public Crossing License Issued by PUC (Yes/No)	Yes	Conductor Vertical Separation	1.5 (Middle Phase)
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	0.291
Right of Way Width	257.6 feet	Back Pole Number	318-58
Number of Circuits within ROW	1 new(AC), 3 existing	Back Structure Height	43
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	316.19
Total Structures/Poles/Manholes	18	Back Conductor Height	35.5
First Structure Identification	318-52	Back Conductor Elev. at Pole	351.69
State Listed Public Waters (Yes/No/Not Applicable)	Yes	Forward Pole Number	318-57
Last Structure Identification	318-70	Forward Structure Height	43
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	315.79
		Forward Conductor Height	35.5
		Forward Conductor Elev. at Pole	351.29
		Span (Feet)	180.43
		Max Tension NESC Heavy lbs.	3,000
		Max Operating Temp (°F)	120
		Calc'd Horiz.Tension@MaxTemp	470
		Calc'd. Clearance (SAG 10)	32
		Clearance Shown on Profile	32
		Req'd Clearance (NESC)	25.5
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	This section of Turtle Pond is used recreationally for boating, canoe and kayaking, and fishing.		
	In order to determine the minimum NESC clearance above the water, the engineering design incorporates flood water elevations that are based on information contained in flood insurance rate maps provided by FEMA. The design uses the 100-year flood elevation for this portion of the river.		
	The design incorporates NESC minimum required clearance above the water for the neutral wires, using 100-year flood data (25.5 feet). In this configuration, the neutral wires are located approximately 6 feet below the phase conductors.		
Conclusions	The proposed public water crossing will not substantially affect the public rights in these waters, nor will the proposed crossing substantially affect the functional use and safety in these public waters.		
	The the proposed design for this overhead crossing across public waters meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public waters identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public water crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Soucook River, Concord, NH, for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-460	Voltage	345 kV
PUC Zone	4	Circuit	3132
PUC Map Number	23	Conductor Type	ACSR
Petitioner (NPT, ESE)	NPT	Code Name	Lapwing
Petitioner Line List # (for Parcels traversed)	8951	Conductor Size	1590 kcmil
Crossing Circuit Configuration	Overhead	Stranding	45/7
Public Crossing Type (Water/Land)	Water	Conductor Horizontal Separation	26
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	0
Relocated ESE Crossing (Yes/No/NA)	NA	Cable Weight (Lbs/Ft)	1.792
Right of Way Width	265 feet	Back Pole Number	3132-159
Number of Circuits within ROW	1 new(AC), 2 existing	Back Structure Height	75
Foreign Utilities within ROW	Yes	Back Ground Elevation (Ft)	337.69
Total Structures/Poles/Manholes	2	Back Conductor Height	49.5
First Structure Identification	3132-159	Back Conductor Elev. at Pole	387.19
State Listed Public Waters (Yes/No/Not Applicable)	Yes	Forward Pole Number	3132-160
Last Structure Identification	3132-160	Forward Structure Height	90
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	265.62
		Forward Conductor Height	64.5
		Forward Conductor Elev. at Pole	330.12
		Span (Feet)	919.04
		Max Tension NESC Heavy lbs.	11,400
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	4,412
		Calc'd. Clearance (SAG 10)	61
		Clearance Shown on Profile	59
		Req'd Clearance (NESC)	34.7
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	This section of the Soucook River is used recreationally for canoe and kayaking, fishing and swimming.		
	In order to determine the minimum NESC clearance above the water, the engineering design incorporates flood water elevations that are based on information contained in flood insurance rate maps provided by FEMA. The design uses the 100-year flood elevation for this portion of the river.		
	The design incorporates NESC minimum required clearance above the water for these open supply conductors, using 100-year flood data (28.5 feet) plus the additional NESC Rule 232.C.1 requirement (6.24 feet) brings the minimum clearance to 34.7 feet.		
Conclusions	The proposed public water crossing will not substantially affect the public rights in these waters, nor will the proposed crossing substantially affect the functional use and safety in these public waters.		
	The the proposed design for this overhead crossing across public waters meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public waters identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public water crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Soucook River, Concord, NH, for ESE

General Information		Technical Information	
PUC Docket Number	DE 15-462	Voltage	115 kV
PUC Zone	4	Circuit	C189
PUC Map Number	23	Conductor Type	ACSR
Petitioner (NPT, ESE)	ESE	Code Name	Lapwing
Petitioner Line List # (for Parcels traversed)	8951	Conductor Size	1590 kcmil
Crossing Circuit Configuration	Overhead	Stranding	45/7
Public Crossing Type (Water/Land)	Water	Conductor Horizontal Separation	0
Previous Public Crossing License Issued by PUC (Yes/No)	Yes	Conductor Vertical Separation	12
Relocated ESE Crossing (Yes/No/NA)	No	Cable Weight (Lbs/Ft)	1.792
Right of Way Width	265 feet	Back Pole Number	C189-32
Number of Circuits within ROW	1 new(AC), 2 existing	Back Structure Height	75
Foreign Utilities within ROW	Yes	Back Ground Elevation (Ft)	339.6
Total Structures/Poles/Manholes	2	Back Conductor Height	37.5
First Structure Identification	C189-32	Back Conductor Elev. at Pole	377.1
State Listed Public Waters (Yes/No/Not Applicable)	Yes	Forward Pole Number	C189-31
Last Structure Identification	C189-31	Forward Structure Height	95
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	269.1
		Forward Conductor Height	57.5
		Forward Conductor Elev. at Pole	326.6
		Span (Feet)	1172.48
		Max Tension NESC Heavy lbs.	11,400
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	4,792
		Calc'd. Clearance (SAG 10)	35
		Clearance Shown on Profile	33
		Req'd Clearance (NESC)	30.1
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	This section of the Soucook River is used recreationally for canoe and kayaking, fishing and swimming.		
	In order to determine the minimum NESC clearance above the water, the engineering design incorporates flood water elevations that are based on information contained in flood insurance rate maps provided by FEMA. The design uses the 100-year flood elevation for this portion of the river.		
	The design incorporates NESC minimum required clearance above the water for these open supply conductors, using 100-year flood data (28.5 feet) plus the additional NESC Rule 232.C.1 requirement (1.59 feet) brings the minimum clearance to 30.1 feet.		
Conclusions	The proposed public water crossing will not substantially affect the public rights in these waters, nor will the proposed crossing substantially affect the functional use and safety in these public waters.		
	The the proposed design for this overhead crossing across public waters meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric lines over and across the public waters identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public water crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Soucook River, Concord, NH, for ESE

General Information		Technical Information	
PUC Docket Number	DE 15-462	Voltage	115 kV
PUC Zone	4	Circuit	115 kV
PUC Map Number	23	Conductor Type	ACSR
Petitioner (NPT, ESE)	ESE	Code Name	Drake
Petitioner Line List # (for Parcels traversed)	8951	Conductor Size	795 kcmil
Crossing Circuit Configuration	Overhead	Stranding	26/7
Public Crossing Type (Water/Land)	Water	Conductor Horizontal Separation	0
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	12
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	1.094
Right of Way Width	265 feet	Back Pole Number	P145-73
Number of Circuits within ROW	3	Back Structure Height	90
Foreign Utilities within ROW	Yes	Back Ground Elevation (Ft)	328.53
Total Structures/Poles/Manholes	2	Back Conductor Height	52.5
First Structure Identification	P145-73	Back Conductor Elev. at Pole	381.03
State Listed Public Waters (Yes/No/Not Applicable)	Yes	Forward Pole Number	P145-72
Last Structure Identification	P145-72	Forward Structure Height	105
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	268.89
		Forward Conductor Height	67.5
		Forward Conductor Elev. at Pole	336.39
		Span (Feet)	1172.27
		Max Tension NESC Heavy lbs.	9,000
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	3,312
		Calc'd. Clearance (SAG 10)	62
		Clearance Shown on Profile	59
		Req'd Clearance (NESC)	30.1
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	This section of the Soucook River is used recreationally for canoe and kayaking, fishing and swimming.		
	In order to determine the minimum NESC clearance above the water, the engineering design incorporates flood water elevations that are based on information contained in flood insurance rate maps provided by FEMA. The design uses the 100-year flood elevation for this portion of the river.		
	The design incorporates NESC minimum required clearance above the water for these open supply conductors, using 100-year flood data (28.5 feet) plus the additional NESC Rule 232.C.1 requirement (1.59 feet) brings the minimum clearance to 30.1 feet.		
Conclusions	The proposed public water crossing will not substantially affect the public rights in these waters, nor will the proposed crossing substantially affect the functional use and safety in these public waters.		
	The the proposed design for this overhead crossing across public waters meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public waters identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public water crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: NH Adjutant General Property, Pembroke, NH, for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-461	Voltage	345 kV
PUC Zone	4	Circuit	3132
PUC Map Number	23	Conductor Type	ACSR
Petitioner (NPT, ESE)	NPT	Code Name	Lapwing
Petitioner Line List # (for Parcels traversed)	8954, 8957	Conductor Size	1590 kcmil
Crossing Circuit Configuration	Overhead	Stranding	45/7
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	26
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	0
Relocated ESE Crossing (Yes/No/NA)	NA	Cable Weight (Lbs/Ft)	1.792
Right of Way Width	265 feet	Back Pole Number	3132-162
Number of Circuits within ROW	1 new(AC), 2 existing	Back Structure Height	95
Foreign Utilities within ROW	Yes	Back Ground Elevation (Ft)	351.38
Total Structures/Poles/Manholes	5	Back Conductor Height	70
First Structure Identification	3132-159	Back Conductor Elev. at Pole	421.38
State Listed Public Waters (Yes/No/Not Applicable)	Not Applicable	Forward Pole Number	3132-163
Last Structure Identification	3132-165	Forward Structure Height	95
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	3,672 feet	Forward Ground Elevation	346.4
		Forward Conductor Height	70
		Forward Conductor Elev. at Pole	416.4
		Span (Feet)	799.56
		Max Tension NESC Heavy lbs.	11,400
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	4,170
		Calc'd. Clearance (SAG 10)	30
		Clearance Shown on Profile	31
		Req'd Clearance (NESC)	20.8
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	This NPT crossing traverses State-owned land in this section of Pembroke, NH. The land is managed by the NH Adjutant General, and used by the NH National Guard Regional Training Institute. The National Guard is also proposing to build construct an Army National Guard Readiness Center on this property.		
	The Adjutant General's response to Staff's inquiry was a generally favorable assessment of how Eversource has maintained its existing facilities within the easement across the property. The Adjutant General does not foresee the NPT project causing negative impacts or affects of the public to use the land.		
	The existing easement provides public access to interior portions of the unrestricted State land, primarily for unsanctioned All-terrain vehicle usage within the easement area. The property is known to contain a number of rare, threatened and endangered species for which the Adjutant General's office manages the land use.		
Conclusions	The proposed public land crossing will not substantially affect the public rights on this land, nor will the proposed crossing substantially affect the fuctional use and safety in these public lands.		
	The proposed design for this overhead crossing of public lands meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public lands identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: NH Adjutant General Property, Pembroke, NH, for ESE

General Information		Technical Information	
PUC Docket Number	DE 15-463	Voltage	115 kV
PUC Zone	4	Circuit	P145
PUC Map Number	23	Conductor Type	ACSR
Petitioner (NPT, ESE)	ESE	Code Name	Drake
Petitioner Line List # (for Parcels traversed)	8954, 8957	Conductor Size	795 kcmil
Crossing Circuit Configuration	Overhead	Stranding	26/7
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	--
Previous Public Crossing License Issued by PUC (Yes/No)	Yes	Conductor Vertical Separation	--
Relocated ESE Crossing (Yes/No/NA)	Yes	Cable Weight (Lbs/Ft)	1.094
Right of Way Width	265 feet	Back Pole Number	P145-73
Number of Circuits within ROW	1 new(AC), 2 existing	Back Structure Height	90
Foreign Utilities within ROW	Yes	Back Ground Elevation (Ft)	328.53
Total Structures/Poles/Manholes	6	Back Conductor Height	52.5
First Structure Identification	P145-73	Back Conductor Elev. at Pole	381.03
State Listed Public Waters (Yes/No/Not Applicable)	Not Applicable	Forward Pole Number	P145-72
Last Structure Identification	P145-66	Forward Structure Height	105
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	3,672 feet	Forward Ground Elevation	268.89
		Forward Conductor Height	67.5
		Forward Conductor Elev. at Pole	336.39
		Span (Feet)	1172.27
		Max Tension NESC Heavy lbs.	9,000
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	3,312
		Calc'd. Clearance (SAG 10)	31
		Clearance Shown on Profile	29
		Req'd Clearance (NESC)	16.1
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	This ESE crossing traverses State-owned land in this section of Pembroke, NH. The land is managed by the NH Adjutant General, and used by the NH National Guard Regional Training Institute. The National Guard is also proposing to build construct an Army National Guard Readiness Center on this property.		
	The Adjutant General's response to Staff's inquiry was a generally favorable assessment of how Eversource has maintained its existing facilities within the easement across the property. The Adjutant General does not foresee the NPT project causing negative impacts or affects of the public to use the land.		
	The existing easement provides public access to interior portions of the unrestricted State land, primarily for unsanctioned All-terrain vehicle usage within the easement area. The property is known to contain a number of rare, threatened and endangered species for which the Adjutant General's office manages the land use.		
Conclusions	The proposed public land crossing will not substantially affect the public rights on this land, nor will the proposed crossing substantially affect the fuctional use and safety in these public lands.		
	The proposed design for this overhead crossing of public lands meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public lands identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: NH Adjutant General Property, Pembroke, NH, for ESE

General Information		Technical Information	
PUC Docket Number	DE 15-463	Voltage	115 kV
PUC Zone	4	Circuit	C189
PUC Map Number	23	Conductor Type	ACSR
Petitioner (NPT, ESE)	ESE	Code Name	Drake
Petitioner Line List # (for Parcels traversed)	8954, 8957	Conductor Size	795 kcmil
Crossing Circuit Configuration	Overhead	Stranding	26/7
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	--
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	--
Relocated ESE Crossing (Yes/No/NA)	Yes (3 poles)	Cable Weight (Lbs/Ft)	1.094
Right of Way Width	265 feet	Back Pole Number	C189-32
Number of Circuits within ROW	1 new(AC), 2 existing	Back Structure Height	75
Foreign Utilities within ROW	Yes	Back Ground Elevation (Ft)	339.6
Total Structures/Poles/Manholes	6	Back Conductor Height	37.5
First Structure Identification	C189-32	Back Conductor Elev. at Pole	377.1
State Listed Public Waters (Yes/No/Not Applicable)	Not Applicable	Forward Pole Number	C189-31
Last Structure Identification	C189-25	Forward Structure Height	95
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	3,672 feet	Forward Ground Elevation	269.1
		Forward Conductor Height	57.5
		Forward Conductor Elev. at Pole	326.6
		Span (Feet)	1172.47
		Max Tension NESC Heavy lbs.	9,000
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	3,312
		Calc'd. Clearance (SAG 10)	50
		Clearance Shown on Profile	44
		Req'd Clearance (NESC)	16.1
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	This ESE crossing traverses State-owned land in this section of Pembroke, NH. The land is managed by the NH Adjutant General, and used by the NH National Guard Regional Training Institute. The National Guard is also proposing to build construct an Army National Guard Readiness Center on this property.		
	The Adjutant General's response to Staff's inquiry was a generally favorable assessment of how Eversource has maintained its existing facilities within the easement across the property. The Adjutant General does not foresee the NPT project causing negative impacts or affects of the public to use the land.		
	The existing easement provides public access to interior portions of the unrestricted State land, primarily for unsanctioned All-terrain vehicle usage within the easement area. The property is known to contain a number of rare, threatened and endangered species for which the Adjutant General's office manages the land use.		
Conclusions	The proposed public land crossing will not substantially affect the public rights on this land, nor will the proposed crossing substantially affect the fuctional use and safety in these public lands.		
	The proposed design for this overhead crossing of public lands meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public lands identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Suncook River, Pembroke, NH, for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-460	Voltage	345 kV
PUC Zone	4	Circuit	3132
PUC Map Number	24	Conductor Type	ACSR
Petitioner (NPT, ESE)	NPT	Code Name	Lapwing
Petitioner Line List # (for Parcels traversed)	8950	Conductor Size	1590 kcmil
Crossing Circuit Configuration	Overhead	Stranding	45/7
Public Crossing Type (Water/Land)	Water	Conductor Horizontal Separation	--
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	--
Relocated ESE Crossing (Yes/No/NA)	NA	Cable Weight (Lbs/Ft)	1.792
Right of Way Width	150 feet	Back Pole Number	3132-218
Number of Circuits within ROW	2	Back Structure Height	130
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	314.42
Total Structures/Poles/Manholes	3	Back Conductor Height	63.5
First Structure Identification	3132-218	Back Conductor Elev. at Pole	377.92
State Listed Public Waters (Yes/No/Not Applicable)	Yes	Forward Pole Number	3132-219
Last Structure Identification	3132-220	Forward Structure Height	135
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	Not Applicable	Forward Ground Elevation	297.02
		Forward Conductor Height	68.5
		Forward Conductor Elev. at Pole	365.52
		Span (Feet)	682.57
		Max Tension NESC Heavy lbs.	11,400
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	3,878
		Calc'd. Clearance (SAG 10)	40
		Clearance Shown on Profile	38
		Req'd Clearance (NESC)	34.7
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	This section of the Suncook River is used recreationally for canoe and kayaking and fishing.		
	In order to determine the minimum NESC clearance above the water, the engineering design incorporates flood water elevations that are based on information contained in flood insurance rate maps provided by FEMA. The design uses the 100-year flood elevation for this portion of the river.		
	The design incorporates NESC minimum required clearance above the water for these open supply conductors, using 100-year flood data (28.5 feet) plus the additional NESC Rule 232.C.1 requirement (6.24 feet) brings the minimum clearance to 34.7 feet.		
Conclusions	The proposed public water crossing will not substantially affect the public rights in these waters, nor will the proposed crossing substantially affect the functional use and safety in these public waters.		
	The the proposed design for this overhead crossing across public waters meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public waters identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public water crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		

Public Water/Land Crossing Name: Bear Brook State Park, Allenstown, NH, for NPT

General Information		Technical Information	
PUC Docket Number	DE 15-461	Voltage	345 kV
PUC Zone	4	Circuit	3132
PUC Map Number	24	Conductor Type	ACSR
Petitioner (NPT, ESE)	NPT	Code Name	Lapwing
Petitioner Line List # (for Parcels traversed)	9300	Conductor Size	1590 kcmil
Crossing Circuit Configuration	Overhead	Stranding	45/7
Public Crossing Type (Water/Land)	Land	Conductor Horizontal Separation	--
Previous Public Crossing License Issued by PUC (Yes/No)	No	Conductor Vertical Separation	--
Relocated ESE Crossing (Yes/No/NA)	NA	Cable Weight (Lbs/Ft)	1.792
Right of Way Width	150 feet	Back Pole Number	3132-225
Number of Circuits within ROW	1 new (AC), 1 existing	Back Structure Height	125
Foreign Utilities within ROW	None	Back Ground Elevation (Ft)	477.52
Total Structures/Poles/Manholes	9	Back Conductor Height	59
First Structure Identification	3132-218	Back Conductor Elev. at Pole	536.52
State Listed Public Waters (Yes/No/Not Applicable)	Not Applicable	Forward Pole Number	3132-226
Last Structure Identification	3132-228	Forward Structure Height	145
PUC Approximate Length of crossing for License (Land only) [Does Not apply to Water or Rail]	4,270 feet	Forward Ground Elevation	465.68
		Forward Conductor Height	79
		Forward Conductor Elev. at Pole	544.68
		Span (Feet)	596.3
		Max Tension NESC Heavy lbs.	11,400
		Max Operating Temp (°F)	285
		Calc'd Horiz.Tension@MaxTemp	3,618
		Calc'd. Clearance (SAG 10)	34
		Clearance Shown on Profile	30
		Req'd Clearance (NESC)	20.8
Crossing Comments, Conclusions, Conditions, and Staff Recommendation			
Comments	This NPT crossing traverses a section of State-owned land across Bear Brook State Park, in Allenstown, NH. The land is managed by the NH DRED.		
	NH DRED did not respond to Staff's request for comments. However, based on comments from the NH DOT and the NH Adjutant General's office, Staff believes it is safe to assume that Eversource has maintained its facilities within this easement in a responsible manner.		
	Bear Brook State Park is used for a variety of recreation activities including snowmobiling, cross country skiing, walking, hiking, biking, etc..		
Conclusions	The proposed public land crossing will not substantially affect the public rights on this land, nor will the proposed crossing substantially affect the functional use and safety in these public lands.		
	The proposed design for this overhead crossing of public lands meets or exceeds NESC requirements for the expected recreational use by the public.		
Staff Recommendation	That the Commission grant the license to construct, maintain and operate the electric and communication lines over and across the public lands identified in the petition.		
Staff Recommended Conditions applied to License	The license for this public land crossing is contingent upon the Northern Pass Project receiving a Certificate of Site and Facility from the SEC.		